PATENT SPECIFICATION (11) 1 456 558

1 456 558

(21) Application No. 7137/74 (22) Filed 15 Feb. 1974 (19)
(31) Convention Application No. 7 313 099 (32) Filed 11 April 1973 in
(33) France (FR)
(44) Complete Specification published 24 Nov. 1976
(51) INT. CL.² F01P 3/18
(52) Index at acceptance
F4S 42K 8
B7H A2F
F2S 30 6E2

(54) IMPROVEMENTS IN OR RELATING TO HEAT EXCHANGERS

(71) We, SOCIETE ANONYME DES USINES CHAUSSON, a Body Corporate organised under the laws of France, of 35, rue Malakoff, at Asnieres-92 (Hauts-de-Seine) France, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it it to be performed, to be particularly described in and by the following statement:—

This invention relates to heat exchangers and particularly to mountings therefor.

According to the present invention, there is provided a heat exchanger including a header box having a hollowed portion in its outside wall, and means to connect together the header box and another member, said means including a distortable part arranged to be compressed and expanded outwardly to grip the internal wall surfaces of said hollowed portion by a further part which serves to connect together the header box and the other member upon causing said distortable part to be compressed and expanded as aforesaid.

For a better understanding of the invention and to show how the same may be carried into effect, reference will now be made, by way of example, to the accompanying drawings, in which:—

Figure 1 is a diagrammatic side view, partly in section, of a radiator,

Figure 2 is an enlarged sectional view of the detail A of Figure 1,

Figure 3 is an enlarged sectional view of the detail B in Figure 1,

Figure 4 is an enlarged sectional view of a modified radiator mounting,

Figure 5 is an enlarged sectional view of a second modified radiator mounting, and

Figure 6 is an enlarged sectional view of a third modification of radiator mounting.

Figure 1 shows a radiator comprising a core 1 having tubes which are fitted in header boxes 2 and 3 made of moulded material, for example, synthetic resin or glass.

To allow for mounting of the radiator on a support, e.g. a cross member 4 or a bracket 5, or to connect it to a separate support member or an accessory 6, hollowed portions or cavities 7 are formed in the outside walls of the header box during the moulding process, these cavities each having, for example, a circular cross-section. The cavities 7 are intended to receive distortable ring-shaped parts 8, particularly of rubber, which can be compressed or expanded outwardly into respective cavities 7 to grip the internal wall surfaces of the cavities, as to be described later.

Figure 2 illustrates a form of mounting to mount the radiator on the cross member 4 or the bracket 5, for example. The right-hand side of Figure 2 shows the mounting before the parts are tightened. The cavity 7 receives the part 8 with an easy fit or with some clearance and the part 8 is bored to contain a spacer in the form of a reinforcing insert sleeve 9 through which is passed a shank 10 of a bolt. A head 10*a* of the bolt is engaged in an inner cavity 7*a* of the cavity 7, the inner cavity 7*a* being so shaped as to prevent the head 10*a* rotating. The sleeve 9 could be an integral part of the bolt.

Washers 11 and 12 are placed on the bolt on both sides of the distortable part 8, these washers having a diameter somewhat smaller than the inside diameter of the cavity 7.

A spacer in the form of a reinforcing insert sleeve 14 carrying a second distortable part 13 which has approximately the shape of a mushroom (though this is not necessary in all cases) is passed over the shank 10 of the bolt which is protruding from the cavity 7 so that the part 13 and/or the sleeve 14 contacts the washer 12. A washer 15 can be provided on the shank 10 of the bolt between the sleeve 14 and a tightening nut 16 on the free end of the bolt.

Before the nut 16 and washer 15 are put into position, the distortable part 13 is passed through an aperture in the cross-member 4 until the head of the part 13 prevents further passage. To prevent the distortable part 13 from being sheared by move-

DOCID: <GB___1456558A__I_>

ment of the cross-member 4, a protective collar 17 can be passed around the part 13 as shown, so that the wall of the aperture in the cross-member 4 contacts the collar 17. The collar 17 can be glued or otherwise stuck to the part 13.

When actually mounting the header box 2 or 3 on a support such as the cross-member 4, with the part 8 engaged in the cavity 7 and the collar 17 engaged in the aperture of the cross-member 4, the nut 16 is tightened. As a result, the washer 15 first contacts the sleeve 14. Further tightening causes the distortable parts 13 and 8 to be compressed simultaneously between the washers 15 and 12 and 12 and 11, respectively. Upon completion of tightening, the above described components will have reached the position shown on the left-hand side of Figure 2, with the part 8 strongly pressed against and gripping the inner wall of the cavity 7 so that it cannot slide therein.

By appropriately selecting the lengths of the two reinforcing insert sleeves 9 and 14, the relative degree of deformation between the distortion parts 8 and 13 can be substantially varied. This enables a high compression force to be imparted to the part 8 without such a high compression force being imparted to the part 13, so that it is then possible to provide a radiator mounting which has a useful resiliency, for example, by enabling the part 13 to absorb vibrations and also to compensate for alignment differences.

When one of the header boxes, for example, the header box 2, has to support an accessory 6, then as shown in Figure 3, two bolt rods 10_1, 10_2 each extend through, as previously, one distortable part 8, each having an insert sleeve 9*a* with washers 11*a* and 12*a*. The accessory 6 is provided with apertures so that it is placed over the free ends of the bolts, washers 15*a* being placed between the accessory and nuts 16*a* on the bolts. Upon tightening the nuts 16*a*, each bolt rod 10_1 is progressively raised and its head 10*a* tightens and distorts the member 8 which is thus anchored in the corresponding cavity 7. The washer 12*a* need not be provided. As with Figure 2, the right-hand side of Figure 3 shows the assembly before tightening and the left-hand side shows it after tightening.

If it is desired to increase the strength of the radiator mounting further, then the wall of the cavity 7 may be provided with projections, for example, ribs 18 which, as shown in Figure 4 can be in the form of a pronounced screw-thread, so that, as can be seen on the right-hand side of Figure 4, the ribs do not impede insertion of the member 8 but, as seen on the left-hand side of Figure 4, the configuration of the wall of the cavity 7 is taken by the material of the member 8 when it is distorted upon tightening between the nut on the bolt 10_2 and the washer 11*b*.

Of course, if desired, in any of the cases described, the position of the bolt can be inverted and consequently, the nut 16, 16*a* may be placed in the inner cavity 7*a*.

Figure 5 shows a form of radiator mounting in which a protrusion 19 is formed in the base of the cavity 7 of the header box 2, 3, the protrusion being, for example, in the shape of a cone. The wall of the cavity 7 can also advantageously have the previously described ribs 18.

In such a case, the head 10*a* of the bolt 10 is substituted by a bored end piece 20 having at least one peripheral rib 21. The end piece 20 is split into a plurality of portions proceeding around its periphery and a flange 22 is formed at its base.

Before tightening the nut 16*a*, the end piece 20 is in the position shown on the right-hand side of Figure 5, in which position the distortable part is free to move in the cavity 7. By upwardly pushing in the direction of arrow f_1 on the rod of the bolt 10, the end piece 20 is forced out of shape by the protrusion 19 which separates the split portions of the end piece 20 and the rib 21 engages the material of the distortable part 8 as shown at 21*a* on the left-hand side of Figure 5. This compresses the distortable part 8 which then expands into the ribs 18, thus ensuring anchorage of the rod of the bolt 10 on which can then be placed an insert sleeve 14*a* surrounded by a second distortable ring shaped part 13*a* carrying a cross-member 4*a* and securing the cross-member to the header box when the part 13*a* is distorted upon tightening of the nut 16*a*.

With the form of radiator mounting shown in Figure 6, the header box 2 is provided with a hollowed portion in the form of a hollow shaft 23 to house the distortable part 8, this shaft 23 serving the same purpose as the recesses 7 of the embodiments described above. In the present case, the distortable part 8 is cylindrical or conical, depending on the shape of the shaft 23. As in the other embodiments, a rod or a bolt 10 is passed through the distortable part 8 which is then distorted and extended against the inner walls of the shaft upon being tightened between the washers 11*a* and 12*a*. One end of the rod or bolt supports the accessory 24 which can be a radiator support member.

It will be appreciated that several hollowed portions can be provided in one header box.

WHAT WE CLAIM IS:—

1. A heat exchanger including a header box having a hollowed portion in its outside wall, and means to connect together the header box and another member, said means including a distortable part arranged to be

compressed and expanded outwardly to grip the internal wall surfaces of said hollowed portion by a further part which serves to connect together the header box and the other member upon causing said distortable part to be compressed and expanded as aforesaid.

2. A heat exchanger as claimed in claim 1, wherein said further part is a nut and bolt arrangement.

3. A heat exchanger as claimed in claim 2, wherein the shank of said bolt passes through said distortable part.

4. A heat exchanger as claimed in claim 2 or 3, wherein said hollowed portion has a cavity in its base which can receive the nut or the bolt of said nut and bolt arrangement, said cavity being such as to prevent rotation of said nut or bolt.

5. A heat exchanger as claimed in claim 3, or claims 3 and 4, wherein washers are placed on the shank of said bolt, one on either side of said distortable part.

6. A heat exchanger as claimed in any one of the preceding claims, wherein a spacer is provided within said distortable part to limit compression thereof.

7. A heat exchanger as claimed in claim 6 as appendant to claim 3, wherein said spacer is an insert sleeve surrounding the shank of said bolt.

8. A heat exchanger as claimed in any one of the preceding claims, wherein said header box is made of moulded material.

9. A heat exchanger as claimed in any one of the preceding claims and further comprising a second distortable part which can be fitted within an aperture in said other member, when present.

10. A heat exchanger as claimed in claims 2 and 9 or claim 9 and any one of claims 3 to 8 as appendant to claim 2, wherein the bolt passes through said second distortable part, there being an insert sleeve surrounding said bolt and within said second distortable part.

11. A heat exchanger as claimed in claims 7 and 10, wherein the relative lengths of each said insert sleeve have been selected to provide a desired relative degree of deformation between said first and second distortable parts.

12. A heat exchanger as claimed in any one of the preceding claims, wherein the internal wall surfaces of said hollowed portion are provided with projections to enhance gripping of the first mentioned distortable part therein.

13. A heat exchanger as claimed in claim 3 or any one of claims 4 to 12 as appendant to claim 3, wherein part of the shank of said bolt, which is intended to pass into the first mentioned distortable part, is provided with a peripheral rib to cause deformation of this distortable part upon engagement of the rod in the part.

14. A heat exchanger as claimed in claim 13, but without claim 4, wherein the end of the bolt nearest said peripheral rib is formed by a bored end piece which is split into a plurality of portions proceeding around its periphery, the base of said hollowed portion being provided with a protrusion which is intended to force the split portions of said end piece apart upon insertion of said shank into said hollowed portion.

15. A heat exchanger as claimed in claim 14, wherein said protrusion is in the form of a cone.

16. A heat exchanger as claimed in claim 1, 2, or 3, or claim 5 and/or claim 8 as appendant to claim 1, 2 or 3, wherein said hollowed portion is in the form of a hollow shaft, said distortable part being cylindrical or conical, depending on the shape of said shaft.

17. A heat exchanger as claimed in any one of the preceding claims and connected to said other member which is a support member or an accessory for said heat exchanger.

18. A heat exchanger, substantially as hereinbefore described with reference to the accompanying drawings.

HASELTINE, LAKE & CO.,
Chartered Patent Agents,
Hazlitt House,
28 Southampton Buildings,
Chancery Lane, London, WC2A 1AT,
also
Temple Gate House, Temple Gate,
Bristol BS1 6PT,
and
9 Park Square, Leeds, LS1 2LH, Yorks.
Agents for the Applicants.

Printed for Her Majesty's Stationery Office by Burgess & Son (Abingdon), Ltd.—1976
Published at The Patent Office, 25 Southampton Buildings, London, WC2A 1AY
from which copies may be obtained.

DOCID: <GB___1456558A__I_>

1456558 COMPLETE SPECIFICATION
3 SHEETS *This drawing is a reproduction of the Original on a reduced scale*
Sheet 1

Fig.2.

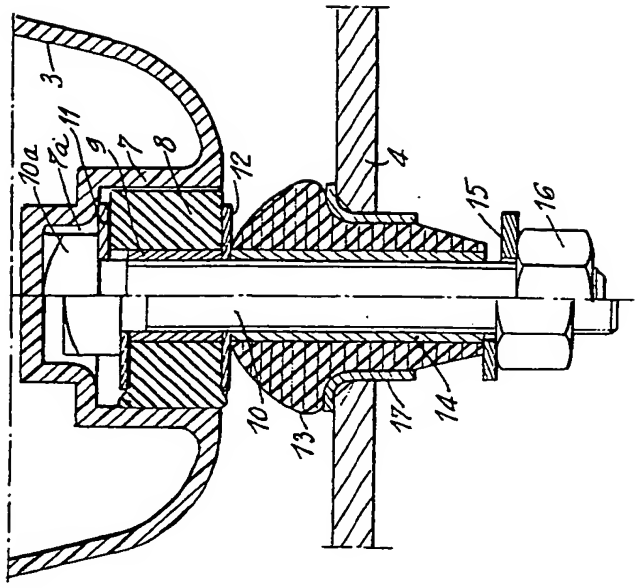
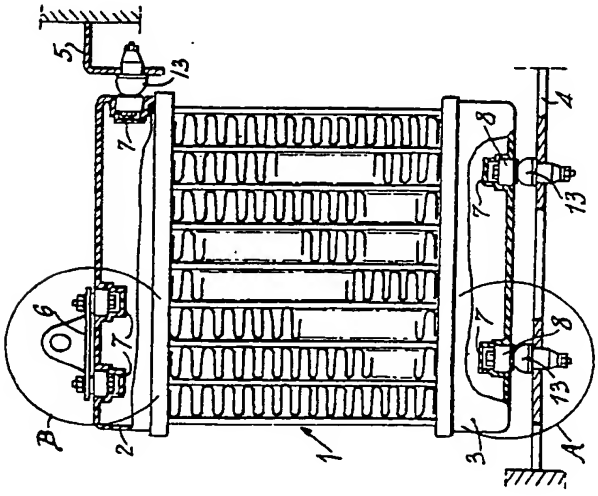


Fig.1.



3DOCID: <GB _ 1456558A I >

1456558 COMPLETE SPECIFICATION
3 SHEETS *This drawing is a reproduction of the Original on a reduced scale*
Sheet 2

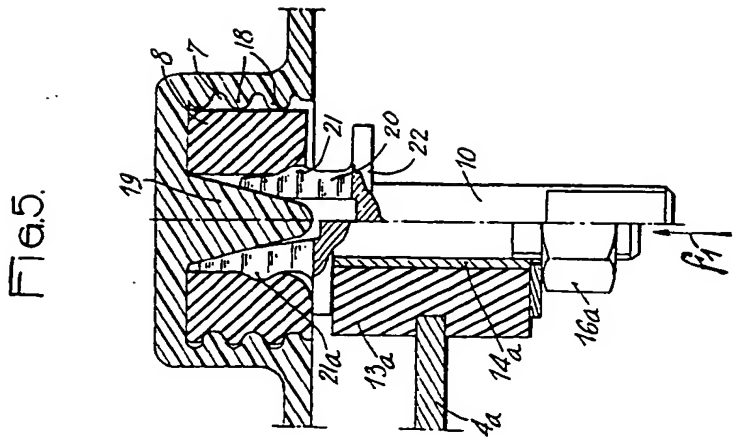


FIG.5.

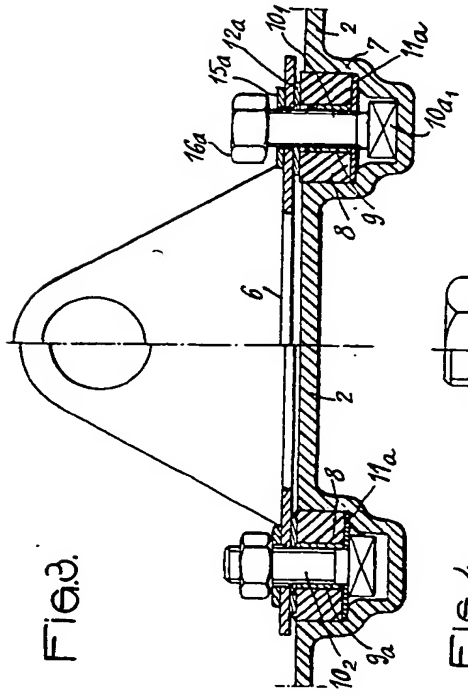


FIG.3.

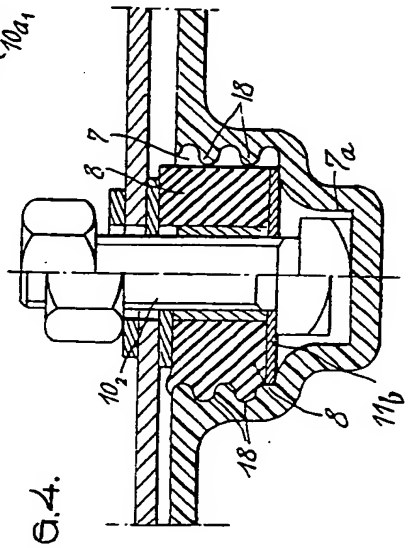


FIG.4.

DOCID: <GB 1456558A I >

Fig.6.